Title: Happy Birthday!

Brief Overview:

Everyone feels that his or her birthday is an important event. Students will utilize their prior knowledge of birthday parties to explore, extend, and develop an understanding of how patterns work.

Links to Standards:

- **Mathematics as Problem Solving**
  Students will demonstrate their ability to solve problems in mathematics including problems with open-ended answers, problems which are solved in a cooperative atmosphere, and problems which are solved with the use of technology.

- **Mathematics as Communication**
  Students will demonstrate their ability to communicate mathematically. They will read, write, and discuss mathematics with language and the signs, symbols, and terms of the discipline.

- **Mathematics as Reasoning**
  Students will demonstrate their ability to reason mathematically. They will make conjectures, gather evidence, and build arguments.

- **Mathematical Connections**
  Students will demonstrate their ability to connect mathematics topics within the discipline and with other disciplines.

- **Number Sense & Operations**
  Students will demonstrate their ability to describe and apply number relationships using concrete and abstract materials. They will choose appropriate operations and describe effects of operations on numbers.

- **Geometry & Spatial Sense**
  Students will demonstrate their ability to describe and apply geometric relationships using one, two, and three dimensional objects.

- **Statistics**
  Students will demonstrate their ability to collect, organize, and display data and will interpret information obtained from displays. They will write reports based on statistical information.

- **Patterns & Relationships**
  Students will demonstrate their ability to recognize numeric and geometric relationships and will generalize a relationship from data.

Grade/Level:

Grades 2-3. The activity stated in the Extension section can be used with a lower functioning 4th grade class.

Duration/Length:

5 one-hour sessions

Prerequisite Knowledge:

Students should have working knowledge of or ability to do the following:

- Creating and analyzing data from a Pictograph
- Identify geometric shapes and their attributes
- Problem solving strategies
- Copy and reproduce a visual representation
- Work cooperatively
- The writing process

Objectives:

Students will:

- gather, organize and depict data to form a pictograph.
- compare, contrast and interpret data in writing using a pictograph.
- use inductive thinking in problem solving**.**
- observe, copy, continue, describe and create patterns.
- work cooperatively in groups.
- read to perform a task.
- write to persuade.

Materials/Resources/Printed Materials:

- 2 package of party hats (2 different prints are needed)
- butcher paper
- 3"x3" white paper - one square per student
- calendar for display
- 3"x5" index cards or paper squares
- unifix cubes - 2 or more different colors
- sentence strips
- pre-cut triangles from white paper - approximately 12 per students

Development/Procedures:

Day 1: " A DAY IN TIME"

- The teacher prepares a chart that lists each month of the year. When the month is called the student(s) will raise a hand to indicate if their birthday is in the month. A student assigned by the teacher will mark with tally marks to show how many students have a birthday in each month.
- Students will illustrate a picture of themselves on a precut square given by the teacher.
- Butcher paper will be used to construct a pictograph. The students will place their pictures under the appropriate month. Viewing the pictograph the teacher will question students to analyze the pictograph.
- The students will then tell in writing three conclusions that could be gathered from analyzing the pictograph

- As closure the students that have a birthday in the month with the most pictures will be given an index card. On the card the student will be asked to write their name on one side and flip the card over to write the date of their birthday. This information will be used during the next lesson.

Day 2: "THE BIRTHDAY WIZARD"

- In preparing for the day's lesson the teacher will randomly select several index cards. Then the teacher will design logic problems based on the children's birthdays. Teacher's resource page 1 provides a sample problem.

- TEACHER'S NOTE: The activities completed on Day 1 and Day 2 are to help establish a framework to encourage the student in mathematical thinking. Mathematical thinking involves four components: • Thinking process - • Knowledge -• Beliefs - • Attitudes

Day 3: "GUESS THE BIRTHDAY HAT PATTERN"

- The teacher will begin the day's lesson by displaying a set of party hats that are arranged in a pattern.

- The students will observe the display. The teacher then allows the students to give information about the display. Possible observation will depend on the pattern set by the teacher. A model of a pattern is given but, the teacher can select his/ her own pattern if desired.
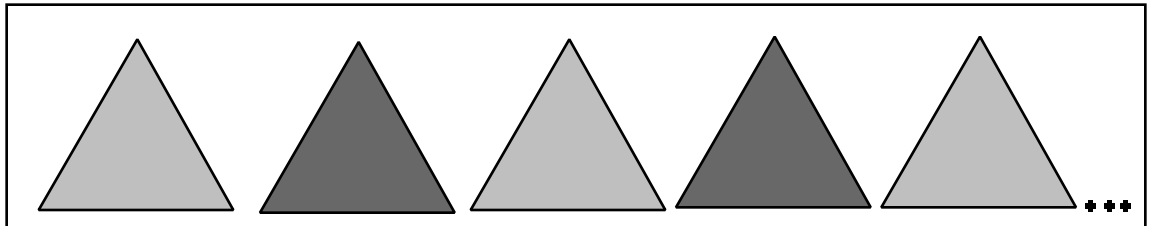
The pattern provided in the box above is: striped hat , polka dot hat, striped hat, polka dot hat, striped hat . . .

- The teacher calls on a student and provides the student with hats so that the pattern can be copied. Another student is called and asked to continue the pattern.
- The students are asked to take out their math journals. Directions are given for the students to give a written description of the pattern. Journal entries are shared.
- Teacher's note: The next activity is to be done in cooperative groups of twos or threes. Unifix cubes are distributed to each group. The students are asked to build with the unifix cubes a representation of the hat pattern.
- A new strategy is being introduced to give a description of a pattern. Lead the student back to your hat display in the room. Tell the students that you will now assign a letter to describe the pattern. Take a sentence strip and cut it into three parts. Take each part and fold in half to simulate a sandwich board. On the sandwich board write the letter A. The letter A will be used for the first hat in the core of the pattern. All other hats that are same as the first one will also be assigned the letter A. (The first letter assigned will be done by the teacher.) The teacher will now lead the students to assign the letter B to the next hat. All other hats that are the same as the second hat will also be assigned the letter B.)
- Ask students: "What is the core of the pattern? How many repetitions of the core are given?"

A	B	A	B	A
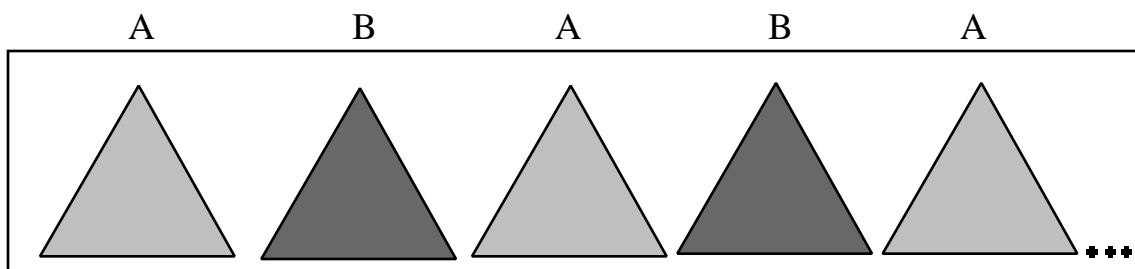
- Generally teachers observe the days of student's birthdays during the school year. If students' birthdays are observed Day 3 activity can be used; if not you might choose to move to Day 4 which is a Performance Task that will be used to assess the knowledge gained from the lessons.
- Students are given a sentence strip and a set of triangles cut from plain white paper. Students are asked to design the triangle paper to represent party hats. The teacher should emphasize that the activity is not an art lesson. A pattern should be established while designing the party hats. Once the hats are designed they should be glued onto the sentence strip in the predetermined pattern. As the activity is being completed the teacher can walk around the room to monitor the student's work.
- Once the activity is completed the student will display their work around the room.
- The students will be asked to group any work that is the same pattern not necessarily the same colors or design used but, pattern . An example might be (a red hat, blue hat, red hat, blue hat) would be grouped with a (star hat, moon hat, star hat, moon hat). Both patterns chosen for the group meet the A.B, A, B, ... pattern. Other possibilities in patterns could be ABCA, ABCA, ... or AABCC, AABCC ..., etc.

Performance Assessment: "DREAM DESIGNER"

The Performance Task will be used as an assessment tool. The Performance Task will make connections to other curriculum areas. The task requires the students to Read to Perform a Task, to write to persuade, and to express patterns in mathematical language and to build mathematical models to exhibit patterns.

Scenario: The teacher presents to the class a letter that was received from a company that requests the students to respond in several ways. The teacher can print the letter on chart paper or use a transparency to project on the overhead projector. See Teacher Resource #2. Students should use a variety of themes such as animals, foods, etc.

Teacher Resources 3 and 4 will be used to score the Performance Task. When scoring the student's products use the appropriate rubric.

Extension/Follow Up:

Literature Connection - Moira's Birthday by Robert Munsch, Illustration by Michael Martchenko

As an introduction to the relationship of patterns in a number form a function table activity can be used. Using this procedure the students can be exposed to a person in history who is responsible for inventing the Fibonacci sequence. Fibonacci sequence is built by adding two numbers together and getting the next number. Example: (1,1,2,3,5,8,13,21,34 ...) Teacher's Note: If the birthday party theme is used, highlight the idea of a magician visiting the party as basis for the activity.

Suggested Script: Matthew's father is performing as a magician at the party. He took off this top hat and said, "Abracadabra." He pulled one rabbit from his hat. He repeated, "Abracadabra." One more rabbit was pulled from the hat. " This is going too slowly," he said. I need a new magic word. This time he said, "Fibonacci," as he pulled two rabbits out of his hat. The kids sat on the edge of their chairs. He tapped his top hat with his magic wand and repeated, "Fibonacci." Three rabbits popped from the hat. The children begin to cheer. He repeated his previous motion and said, "Fibonacci." This time five rabbits popped from his hat. Matthew's mother said, "Honey I think you should stop." Before she knew it there were eight rabbits hopping toward the door.

At this point the teacher will stop and revisit the information that was shared with the students. Using the board she can write the number of rabbits as they appeared in order. (1,1,2,3,5,8. . .)

The teacher can question the student to promote a discussion about the number. She can refer to the formula given if needed. The student should be able to recognize a pattern in the numbers.

Teacher's Note: Fibonacci Fun - Fascinating Activities with Intriguing Numbers by Trudi Hammel Garland, Mathematicians Are People Too, Volume Two, by Luetta Reimer and Wilbert Reimer are both available from Dale Seymore Publications 1995

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TEACHER RESOURCE SHEET #1

CALENDAR PROCESS PROBLEM

Elmer's birthday is in January. Can you use the clues to determine the date of his birthday. Hint: Use the calendar given to assist in the activity.

Clues
1. The date has two digits.

2. This year his birthday was not on a weekday.

3. The ten's digit is bigger than the one digit.

4. When counting by 5's you will say the numeral that is the same as Elmer's birthday.

(Insert a January 1998 calendar and the clues will work.)

Extension Activity

Make up your own clues for a birthday that falls on the 18th, 21st or 15th of January. Exchange the clues with a friend and see if he or she can find the correct date.

Teacher Resource for additional directions see: <u>Problem-Solving Experiences in Mathematics</u> by Addison-Wesley Publishing Company

The Party People
702 Music Lane
Annapolis, Maryland 70502
(Current date)

Your school's name
Your school's address
Students in (your name)'s class

Dear Students:

     Our company is in search of new ideas in planning party themes.* We have been in business for forty years and we need new ideas from children your ages. Our company goes to the parties of children. We decorate, cater, and provide entertainment.

   We need you to submit three banners that represent your theme. Please include a persuasive paragraph telling why your theme should be selected. The banners must meet certain guidelines. Banner 1 should use the AAB pattern. Banner 2 should use the ABBC pattern. Banner 3 can be created using a pattern you create.

Each pattern must have a core, and one repetition to complete the sequence.

   The person who submits the winning banner will receive a trip to Disney World. You will be allowed to invite three people to go with you. Make sure that your banner meets all the requirements. Good luck!

                    Sincerely,

                    Joy Dance

*Some of our previous designees have used a circus theme and a space theme.

Language Arts Rubric

Score	Criteria
3	Correct language usage, paragraph form, three persuasive ideas, and a topic sentence.
2	Correct language usage, paragraph form, two persuasive ideas, and a topic sentence.
1	Paragraph form, one persuasive idea, and a topic sentence.

Math Rubric

Score	Criteria
3	Three Banner patterns that match the pattern description given (AAB core, used two times, ABBC core used in two times, and your pattern core used two times along with a consistent theme.
2	Two Banner patterns that match the pattern descriptions; see above descriptions.
1	One Banner pattern that matches the pattern descriptions; see above descriptions.
0	Did not meet any pattern descriptions.